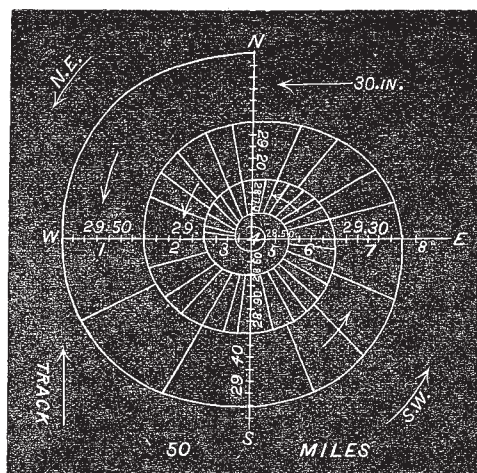


helix, and therefore if the water be driven in at the large end and up to the small end of the spiral, it should considerably increase in height as it went along and move with greater rapidity.

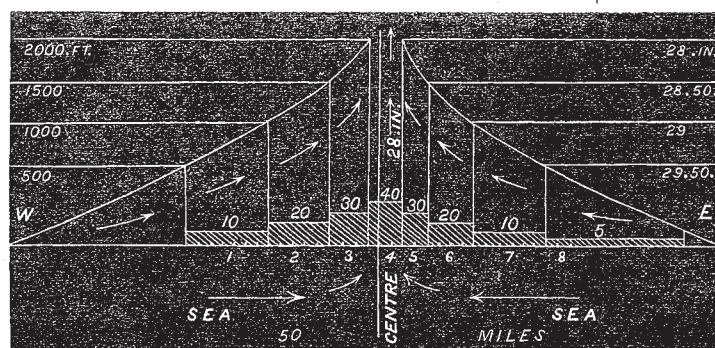
When arrived at the extremity of the spiral, it may be considered to remain there for some time and spread itself out laterally in bulk at the high level as long as the violence of the storm lasted. But when the force of the wind began to diminish, this heaped aqueous mass would more or less suddenly subside,



Cyclone—Horizontal Plan.

and rush down on all sides to seek its natural level. This might occur at sea, and be evidenced by the long swell or rollers frequently seen, or might be translated by progressive motion to launch its tremendous weight on the land, and inundate it. This, it may be conjectured, could only be effected over lands about the level of the sea, over which the base of the funnel of the cyclone would advance, carrying the inclosed mass of water with it for part of the area of the revolving circle, which would so far be still able to draw its supplies from the sea on the coast yet included in its motion. As soon, however, as the southern or equatorial limb of the circle had so far progressed as to leave the sea behind it, then the friction of the earth would prevent the inclosed mass of water following the cyclone, which had been already cut off from its aqueous communication, and it would be left behind to expand over and deluge the country lying under its level.

In speculating on the dimensions of the Bengal storm-wave we may assume, from the statements in the newspapers, that it was a disc of fifty miles in diameter and twenty feet deep, when viewed



{Cyclone—Vertical Section.

as a frustrum of a cylinder, which might also represent, when in a state of gyration, a cone of the same diameter and forty feet high in the centre. The contents of this space would amount to about, in bulk, 1,094,785,668,000 cubic feet, representing a weight of 70,339,979,169,000 lbs of sea-water, which would have flooded over a perfectly level district of a disc of about 700 miles in diameter, or 39,270 square feet in area to the depth of one foot horizontally.

The means for counteracting the disastrous effects of the storm or cyclone-wave in the Delta of the Ganges on life and property, would probably be found in the erection of *mounds*, as proposed by a writer in the *Times*. As this tract of country would be destitute of stone or rock, and be composed chiefly of mud and sand, it would be requisite to convert this into *bricks* first, as the mud-mounds would not stand the impact of the storm-waves, even in this country.

The design for the construction of these mounds would probably be most suitable after the model of the celebrated *Tower of Babel*, projected by the post-Diluvial inhabitants of Mesopotamia for a like purpose of self-preservation from inundation.

VORTEX

### "Polar Cyclones"—Etna Observatory

IN reply to Mr. Clement Ley's letter in NATURE, vol. xv. p. 253, I fear I cannot at all agree with him as to the cause of the polar depressions of the barometer. He says: "The 'polar cyclones' appear to be themselves aggregates of those local depressions, or cyclones, which have penetrated into the Arctic or Antarctic regions, and have there partially or wholly coalesced." Now, let us test the question in this way:—Suppose the surface of our planet were all land, so that there was no watery vapour in the atmosphere; there would be no cyclonic storms, for they are due to what Espy truly calls steam power;—would the polar depressions of the barometer be observed as they are in our actual atmosphere? Mr. Clement Ley's reasoning seems to require him to say that they would not; I have no doubt that they would. The causes which produce the west winds of the middle latitudes (Maury's "counter-trades") would act as in our actual atmosphere, and their centrifugal force, in rotating round the poles, would produce a space of shallow atmosphere at and around each pole, exactly like the depression at the centre of a vortex of water, which would show itself, as at present, by a depression of the barometer.

I see in NATURE of the same date that it is proposed to form a meteorological observatory on Etna. I hope the opportunity may be taken of obtaining what is one of the greatest desiderata in the present state of meteorology—I mean a set of comparative observations of the barometer taken at two neighbouring stations, one at the sea-level, and the other at a great height. One such set, continuous or taken at short intervals, extending over a few years, and accompanied by observations of temperature and wind (the latter by self-registering anemometers), would probably give more information on the physics of barometric waves than could be obtained by any amount of observations, all taken at the sea-level. I have urged this in NATURE before, but it is so important I hope I may do so again.

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, January 20

### The Boomerang

REFERRING to my letter on the "Boomerang" which you were so good as to publish in NATURE, vol. xiv. p. 248, I may, perhaps, be permitted to add a few more statements on the same subject. Concerning the use of the boomerang by the North Gippsland aboriginal natives, I have no more to add, but I have acquired some information in respect to its use among the blackfellows of South Australia, which may be of interest.

My informant is Mr. James, now a senior constable in the Victorian police, but formerly, and when I first became acquainted with him, managing a large cattle station at Blanchewater, on the borders of the so-called Lake Torrens Basin. Mr. James has had great experience among the blacks of that district during many years both before and after the time I first met with him, during my second expedition into Central Australia.

I quote Mr. James's statements to me just as I noted them:—  
"Among the blacks about Blanchewater the boomerang is made for killing game. It is principally thrown among flocks of ducks, pigeons, and water-hens. It is not used often for fighting nor for killing kangaroo. They might use it in a row when short of weapons, and if their adversaries were not more than twenty or thirty yards distant. The blacks did not

generally like to use them except for killing small game, as they often broke, and they have told me that their boomerangs were not 'strong enough' to kill a man. For fighting they have no throwing weapons—no throwing-sticks for their spears, but throw them by the hand, and only do so in extremity, for the spear is too valuable a weapon. It is only used as a pike; and they obtain their spears by barter from some tribe to the north. In ordinary fighting they use a weapon like a boomerang from 4 to 5 feet in length. It is held in both hands and blows are struck with the convex edge. They were not warded off when I saw it used, but the blows were struck indiscriminately—a sort of free fight. These weapons are made by themselves of boxwood.

"In throwing the boomerang I have seen it usually held nearly parallel with the horizon. When thus thrown it would rise and return towards the thrower, but the blackfellows always told me that although they could ensure its returning near them they could not tell exactly where it would come to. They could tell the direction but not the distance. If the boomerang strikes anything its course ceases.

"Some years ago the blackfellows living in the mountains just south of Blanchewater had no boomerangs and no spears. Their weapons were yamsticks and stones. They had no shields. Boomerangs, spears, and shields were acquired by them from the Blanchewater blacks, in return for which they bartered Wallaby rugs; at that time the Blanchewater and Deerie blacks had absolutely no clothing.

"This system of barter is said to have been instituted by a Hill blackfellow named Pompey, who, in 1856, was concerned in the spearing of two men at Angepina. He escaped and went north to the Deerie blacks, having first stayed some time with the Blanchewater blacks, who understood both languages, being a border tribe. He took up to the Deerie blacks some flour, sugar, tobacco, and for some time settled at Kopparamanna. He endeavoured to raise a confederacy to drive the white settlers out of the Flinders Range, and is said at that time to have instituted the system of barter.

"I knew this Pompey in 1857, when he sent another blackfellow, named Blanchewater Charley, to offer his services as 'nauto shepherd.' When Pompey then came in he told me much of the above concerning himself, which was also current among the tribes. He was a very shrewd fellow, and thus became a leader among them. He was afterwards shot for killing station-blacks. The national weapons of the Blanchewater blacks are stones. These are thrown of the size of the fist, and are perhaps thrown as far as a hundred yards, and with precision for forty yards; and in throwing, a rotatory motion is imparted to the stone. At about forty to fifty yards they can hit a small mark, such as a bottle, almost without fail. In fighting at close quarters they ward off spear blows by means of a short stick held in the hand, and if possible, in cases where the spear has been thrown, clutching it in passing with the other. They do not use a shield for stopping spears, but against stones, which, as I have said, are the national weapons."

Although much of the above cannot be said to be strictly belonging to the "boomerang," I have preferred to give Mr James's statements in full as given to me.

Much that he says corroborates the statements I have made in the letter referred to.

It is much to be regretted that no one else than myself among your readers in Australia has recorded their observations on the "boomerang," in reply to your correspondent's request.

Bairnsdale, Gippsland, Victoria

A. W. HOWITT

#### Longmynd Rocks

MR. H. B. WOODWARD, in his "Geology of England and Wales," p. 28, states that, near Shrewsbury, the Longmynd Rocks are overlaid conformably by the Lingula Flags. I should be glad to see the evidence upon which this conclusion is based. So far as I have examined the district, the facts do not sustain Mr. Woodward's view. Arenig fossils are found at the very head of the ravines which cut back nearly to the quartzite of the Stiper Stones. The beds under the quartzite are similar in lithological character to the Arenig shales above, and I have not heard of the lower shales yielding Lingula flag fossils. At the base of the escarpment is the fault which separates the Stiper Stones rocks from the Longmynd beds. I believe the Stiper Stones beds are Arenig, in the absence of proof to the contrary. The quartzose band of the Stiper Stones may represent the arenaceous bed adopted by the Geological Survey as the base of the Arenig.

CHARLES CALLAWAY

Wellington, Salop, January 15

#### The Measurement of the Height of Clouds

It has always been a matter of some interest to obtain measures of the height of clouds, independently of observations made from balloons or on mountains.

During last July and August I made a series of measures of cloud-altitudes—the first, I believe, of their kind—by photographing the clouds simultaneously from different stations.

The details of the process would occupy too much space to be inserted here, but I have reason to believe that the results obtained are not as much as three per cent. in error. The cirrus clouds which I measured varied in height from 22,000 to 25,000 feet; massive cumuli from 6,000 to 7,000 feet. I did not get any good examples of cirro-cumulus or stratus. Rain-clouds appeared at all altitudes up to 4,000 feet. I hope to resume the measures at some future time.

ARNULPH MALLOCH

Terling Place, Witham

#### Mimetic Habit of Bats

In September, 1875, whilst paddling in a dorey (dug out boat) through a narrow and dark creek leading from Belize River, Honduras, to Reid's lagoon, we disturbed a number of small bats which were clinging to the trunks and branches of the mangroves overhanging the water. These bats were about six inches in expanse and of a grey colour so exactly corresponding with that of the trees on which they settled as to be with difficulty distinguishable even at a distance of only a few feet. They invariably *clung* to the trunk or bough *with wings expanded*, and were never, so far as I noticed, suspended from the branches.

I saw the same species in Black Creek of the same river in February last year clinging to the trees in a similar manner, and conclude it is the natural position of the animal when at rest. I send this note as I do not recollect having anywhere seen this curious mimetic resemblance and peculiar habit remarked upon.

101, Grove Street, Liverpool, January 22

S. ARCHER

#### THE SPONTANEOUS GENERATION QUESTION<sup>1</sup>

THE following paper on this subject was read at the Paris Academy of Sciences on January 8<sup>2</sup>—

The Academy has perhaps not forgotten that at the *seance* of July 10 last, Dr. Bastian announced the discovery by him of the physico-chemical conditions necessary and sufficient for the spontaneous generation of certain varieties of microscopic objects of the genus *Bacteria*. The experiment which, according to Dr. Bastian, realises these conditions is very simple; it consists in exactly neutralising by liquor potassæ urine deprived of every organic germ and exposing the mixture to a temperature of fifty degrees. In those conditions certain varieties of bacteria promptly appeared.

Dr. Bastian has no doubt as to the bearing of his conclusions. To all who are attentive to medical movements it is evident that the debate relative to spontaneous generation has been removed into the domain of the etiology of contagious diseases.

I immediately repeated the experiment, and I proved, among other things, that it is sufficient to determine the saturation of the urine by solid potash instead of potash in aqueous solution (which does not modify whatever be the physico-chemical conditions to which it is subjected) for the mixture to remain perfectly sterile. I hence concluded that the interpretation given by Dr. Bastian to his experiment was totally inadmissible.

Dr. Bastian replied (*Comptes Rendus*, July 31 and August 21); he did not at all dispute the legitimacy of my reasoning, but he affirmed that I reproduced his experiment badly and exceeded the exact point of neutralisation of the urine. Such is, according to him, the cause of the sterility of the liquid in my hands.

The question is then limited to the point: Have I done anything else but replace the liquor potassæ by melted potash, and specially, have I exceeded the point of saturation of the urine, and is there anything amiss in so doing?

I have examined the debate reduced to these terms, along with M. Joubert, with all the attention of which we are both of us capable, and we are able to declare to the Academy, on the basis of new experiments, that the exact neutralisation of the urine by solid potash, which we had melted, left the urine sterile. We add, although that may not be indispensable, that there is no obstacle to the fertilisation of urine, in the experi-

<sup>1</sup> Continued from p. 303.

<sup>2</sup> Note on the Alteration of Urine in reference to Recent Communications of Dr. Bastian, by MM. Pasteur and Joubert.